Center Independent Research & Development: JPL IRAD

Two-Phase Thermal Control Technology for Small Spacecraft Exploration

Completed Technology Project (2015 - 2016)

Project Introduction

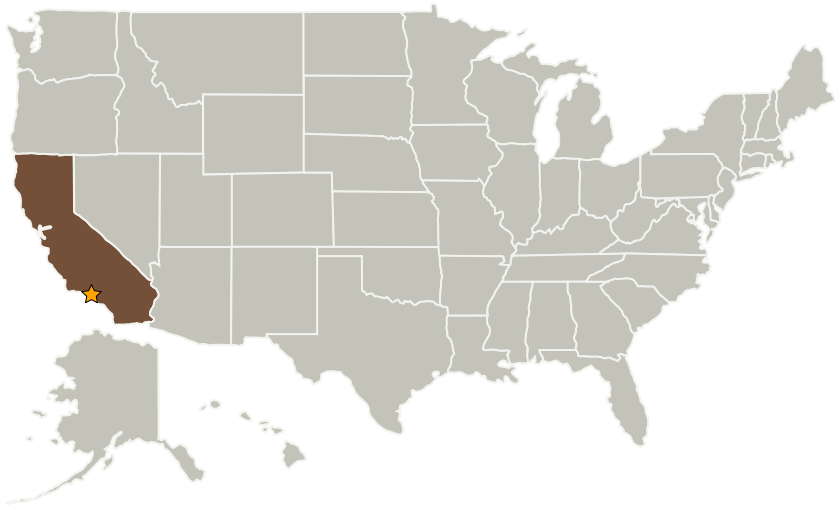
The challenge of this task is to provide an order of magnitude reduction in thermal control power using half the mass while accommodating high heat fluxes and milli-Kelvin stability required for enhanced science.

This task will develop a 2-φ mechanically pumped fluid loop thermal control system for small spacecraft that minimizes system resources, manages spacecraft temperatures, reclaims and redistributes waste heat, and provides science-enabling thermal stability.

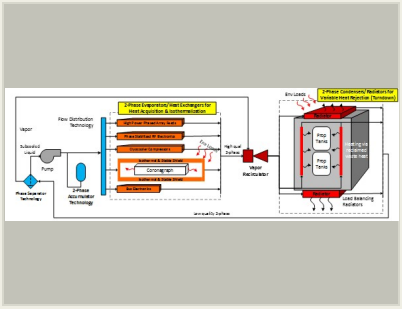
Anticipated Benefits

This technology •Provides order of magnitude reduction in TCS power and 50% reduction in mass over current state-of-the-art. •Accommodates high heat fluxes up to 5 W/cm^2; isothermalization of < 2 ^{o}C over a 1-m payload bench; temporal stability of < 0.05 ^{o}C/minute. •Modular, scalable, configurable to enable integration and at reduced costs. High degree of control authority results in less thermal vacuum testing time.

Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
★Jet Propulsion Laboratory(JPL)	Lead Organization	NASA Center	Pasadena, California



Project Image Two-Phase Thermal Control Process

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Organizational Responsibility

Responsible Mission Directorate:

Mission Support Directorate (MSD)

Lead Center / Facility:

Jet Propulsion Laboratory (JPL)

Responsible Program:

Center Independent Research & Development: JPL IRAD

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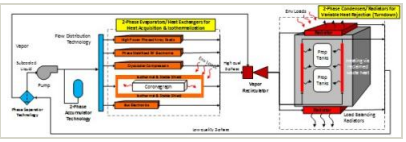
Primary U.S. Work Locations

California

Images



Two-Phase Thermal Control
Project Image Two-Phase Thermal Control Process
(https://techport.nasa.gov/image/26098)

Project Management

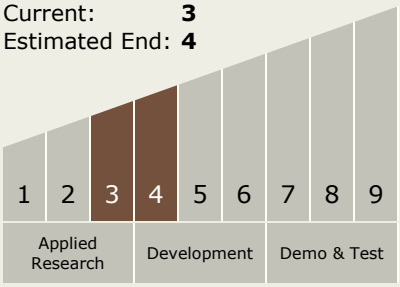
Program Manager:
Fred Y Hadaegh

Project Manager:
Fred Y Hadaegh

Principal Investigator:
Eric T Sunada

Technology Maturity (TRL)

Start: **3**
Current: **3**
Estimated End: **4**



Technology Areas

Primary:

- TX14 Thermal Management Systems
  - TX14.2 Thermal Control Components and Systems
    - TX14.2.3 Heat Rejection and Storage